

A1
cont'd
space. To make such a conversion, the central processing unit often utilizes page address translation and includes a translation look-aside table (TLB) for storing the conversions.

Please replace the paragraph starting on page 1, beginning at line 26, and continuing to page 2, ending with line 2, with the following rewritten paragraph:

A2
The north bridge, upon receiving an address in physical address space from the central processing unit, determines whether the address corresponds to memory, PCI address space, or AGP memory space. If the address is directed towards the AGP address space, the north bridge makes a further translation of the received physical address utilizing a graphics address relocation table (GART) translation. The translated address is then stored in a GART TLB. As such, for the central processing unit to communicate with the AGP bus, two address space translations occur utilizing separate paging, page address translations and two separate TLBs are maintained.

In the Claims:

Please amend the claims as follows:

Please substitute the following claims for claims having the same number:

1. (Amended) A method for virtual address translation, the method comprises the steps of:

receiving a memory access request that includes a virtual address;

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determining whether a physical address translation has been performed for the virtual address, wherein the physical address translation translates the virtual address to an address, wherein the address is a physical address of memory or is further translated to obtain another physical address of the memory;

when the physical address translation or the another physical address translation has been performed for the virtual address, utilizing the physical address or the another physical address to obtain data corresponding to the memory access request;

caching the physical address in a translation look aside table;

when a physical address translation has not been performed for the virtual address, retrieving a physical page address based on at least a portion of the virtual address;

determining whether the physical page address corresponds to a physical address requiring further translation;

when the physical page address does not correspond to a physical address that requires further translation, utilizing the physical page address and a portion of the virtual address to produce the physical address;

when the physical page address corresponds to a physical address that requires further translation, retrieving a second physical page address;

utilizing the second physical page address and a portion of the virtual address to produce the another physical address; and

caching the another physical address in the translation look aside table.

Please delete claims 2, 3, 4 and 5 without prejudice.

6. (Amended) The method of claim 1 further comprises when data corresponding to the memory access request is cached, utilizing the data.

12. (Amended) A virtual address translation module comprises:

a processing module; and

memory operably coupled to the processing module, wherein the memory stores operational instructions that cause the processing module to: receive a memory access request that includes a virtual address; determine whether a physical address translation has been performed for the virtual address, wherein the physical address translation translates the virtual address to an address, wherein the address is a physical address of memory or is further translated to obtain another physical address of the memory; utilize the physical address or the another physical address to obtain data corresponding to the memory access request when the physical address translation or the another physical address translation has been performed for the virtual address; cache the physical address in a translation look aside table; retrieve a physical page address based on at least a portion of the virtual address when a physical address translation has not been performed for the virtual address; determine whether the physical page address corresponds to a physical address requiring further translation; utilize the physical page address and a portion of the virtual address to produce the physical address when the physical page address does not correspond to a physical address that requires further translation; retrieve a second physical page address when the physical page address corresponds to a physical address that requires further translation; utilize the second physical page address and a portion of the virtual address to produce the another physical address; and cache the another physical address in the translation look aside table.

Please delete claims 13, 14, 15 and 16 without prejudice.